REMARKS

Claims 1 and 2 are pending, with claim 1 being independent. The Examiner has maintained the rejection of claim 1 under 35 U.S.C. § 103 as being unpatentable over JP '518 in view of JP '612, and the Examiner's basis for doing so is outlined on page 2 of the outstanding Office Action. Specifically, the Examiner asserts that JP '518 discloses a density of 1.6, whereby JP '612 is relied on to modify JP '518 so that the mean particle circularity thereof is not less than 0.86 for the purposes (relied on motivation) disclosed by JP '612.

Even assuming *arguendo* proper, it is respectfully submitted that the proposed combination of prior art can be rebutted by Applicants in view of the new and unexpected results achieved by the claimed ***combination*** of density and circularity, etc.. As set forth in MPEP § 2144.05(III), Applicants can rebut a *prima facie* case of obviousness based on overlapping ranges by showing the criticality of the claimed range. "The law is replete with cases in which the difference between the claimed invention and the prior art is some range or other variable within the claims. . . . In such a situation, the applicant must show that the particular range is critical, generally by showing that the claimed range achieves unexpected results relative to the prior art range." *In re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990).

Indeed, Applicant can rebut a presumption of obviousness based on a claimed invention that falls within a prior art range by showing "that there are new and unexpected results relative to the prior art." *Iron Grip Barbell Co., Inc. v. USA Sports, Inc.*, 392 F.3d 1317, 1322, 73 USPQ2d 1225, 1228 (Fed. Cir. 2004). In the instant case, it is respectfully submitted that the claimed combination provides new and unexpected results relative to the prior art which are significant. Specifically, the claimed combination enables reducing irreversible capacity, which is a new and unexpected result relative to the prior art. Indeed, neither JP'612 nor JP '518 disclose such a result, let alone suggest how to achieve it.

The Examiner is directed to Applicants' specification under "BACKGROUND OF THE INVENTION", which states:

> The irreversible capacity of carbon per weight is increased when the negative electrode is rolled until the material mixture layer has a carbon density of not less than 1.4 g/cm^3 in order to obtain a higher capacity negative electrode comprising a mixture of graphitized carbon fiber and flake graphite. Although the details of the cause are unknown, it is presumably because graphite particles are broken into fine particles by the excessive rolling to increase the surface area of the negative electrode" (emphasis added).

Turning to the cited prior art, JP'612 does not suggest that increasing the circularity results in a reduction in irreversible capacity. In JP'612, the graphite is rolled to 1.4 g/cm^3 in absence of carbon fiber. Thus, although the graphite of JP '612 has a high circularity of not less than 0.86, it is probably broken into fine particles. Therefore, the irreversible capacity of such graphite of JP '612 would be significantly high. In any event, JP '612 is completely silent as to irreversible capacity.

Similarly, JP'518 is also silent about the irreversible capacity with regard to the disclosed Examples having a density of 1.6 g/cm^3, where the irreversible capacity would be as high as those in Comparative Examples (R8 and R9) described in Applicants' specification. In Examples 12 and 13 of JP '518, regular natural graphite or artificial graphite is used in the same manner as in Comparative Examples (R8 and R9) of Applicants' specification.

In sum, none of the cited references would allow one of ordinary skill in the art to predict the new and unexpected results related to the "reduced irreversible capacity" which can be obtained by using graphite with a circularity of not less than 0.86 in JP'518 including carbon fiber. In addition, JP'518 discloses that the use of a rubber binder results in the increase of the active material density. Accordingly, JP '518 does not suggest the concept of applying a larger

load than usual to graphite in order to increase the active material density, which indicates that JP'518 does not address nor recognize the problem of reducing the irreversible capacity.

In view of the above comments, it is respectfully submitted that the remarkable effects of the claimed combination (i.e., reducing irreversible capacity) is not suggested by the cited prior art and is therefore new and unexpected. Only Applicants have recognized these effects, and conceived of the novel ***combination*** of elements needed to realize those effects as evidenced by Tables 1 and 2 in Applicants' specification. For example, in Table 2, when the carbon density is 1.6 g/cm^3 or more, the irreversible capacities (34 to 37 mAh/g) of the batteries R8 and R9 are significantly greater than that of the battery B4 (Re = 26 to 27 mAh/g) with the same graphite particle size. Accordingly, even assuming *arguendo* that JP '518 and JP '612 disclose the claimed elements ***individually***, it is respectfully submitted that the aforementioned new and unexpected results sufficiently rebuts a proposed combination of the cited prior art as set forth by the cited case law above.

As described throughout Applicants' specification, a spherical natural graphite and a graphitized carbon fiber can be filled in the negative electrode material mixture layer at a density of not less than 1.6 g/cm^3. Attempts to achieve a density of 1.6 g/cm^3 by rolling usually yield a fine powder because the carbon materials are broken down, ending up in an increased surface area of the negative electrode material. As a result, the irreversible capacity increases. Also, the basal planes of the carbon are oriented in parallel with the electrode plate surface on rolling, and therefore lithium ions can not easily migrate in the negative electrode. Consequently, high rate discharge characteristics decrease.

Turning to Applicants' specification, batteries R8 and R9 in Tables 1 and 2 evidence the aforementioned effects. The flak graphite used had a small circularity of 0.78 or 0.72, the shape

of which was far from a sphere. When the flake graphite and the graphitized carbon fiber were filled at a carbon density of 1.6 g/cm^3 or greater, the irreversible capacity (Re) increased to as large as 34 to 37 mAh/g. The high rate discharge characteristics (2C/0.2C) decreased to as low as 81 to 85%.

On the other hand, when the spherical natural graphite having a circularity of not less than 0.86 and the graphitized carbon fiber were filled at a carbon density of 1.6 g/cm^3 or greater (e.g., in the case of Battery B4), the irreversible capacity (Re) decreased to as small as 26 to 27 mAh/g. The high rate discharge characteristics (2C/0.2C) increased to as high as 90 to 91%. Such effect can be attained, as discovered by Applicants, when the spherical natural graphite having a circularity of not less than 0.86 is used in combination with the other recited features of the claimed combination.

Turning to the cited prior art, JP '518 discloses a negative electrode having a carbon density of 1.6 g/cm^3 (Examples 12 to 13) merely because the binder contains an acrylic rubbery copolymer; and not because the natural graphite is made to have a circularity of not less than 0.86, thereby teaching away from any effects which can be achieved by the combination thereof. In this regard, only Applicants have recognized the new/unexpected results obtainable from such a combination.

Indeed, JP '612 teaches that the particle density is adjusted to 1.4 g/cc (corresponding to a carbon density of 1.4 g/cm^3); and does not suggest that the carbon density of the negative electrode should be 1.6 g/cm^3 or greater (see [0053] of JP '612), let alone in combination with a circularity of not less than 0.86. Indeed, page 10, lines 16-21 of Applicants' specification already acknowledge JP '612 in relation to a process by which to form the claimed circularity. In view of the unexpected results which can be achieved by the present application, which are

not suggested by either JP '518 or JP '612, it is respectfully submitted that the claimed combination is not rendered obvious by the proposed combination. Specifically, only Applicants have conceived of the novel combination by which a battery with low irreversible capacity and excellent high rate discharge characteristics, even when the negative electrode of the battery has a carbon density of not less than 1.6 g/cm^3, can be realized.

It is respectfully submitted that the new and unexpected results that can be achieved by the present invention evidences the criticality of the functional/structural interaction of the claimed combination, which have been unbeknownst to the cited prior art and which enables a solution to the previously discussed problem recognized only by Applicants.

Based on the foregoing, it is respectfully submitted that the purported showing of obviousness set forth by the Examiner has been rebutted by evidencing the new and unexpected results that can be achieved by the claimed combination, which results only Applicants recognized and effected. Accordingly, it is respectfully requested that the pending rejection be withdrawn.

CONCLUSION

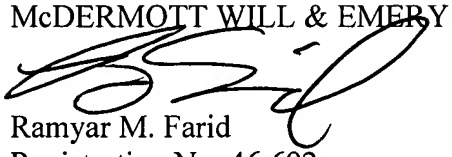
Having fully responded to all matters raised in the Office Action, Applicants submit that all claims are in condition for allowance, an indication for which is respectfully solicited. If there are any outstanding issues that might be resolved by an interview or an Examiner's amendment, the Examiner is requested to call Applicants' attorney at the telephone number shown below.

To the extent necessary, a petition for an extension of time under 37 C.F.R. 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper,

including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

McDERMOTT WILL & EMERY LLP



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